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RICE PRODUCTION IMPROVEMENT PROGRAM (RPEP)



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RICE PRODUCTION ENHANCEMENT PROGRAM (RPEP)

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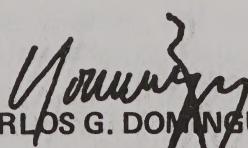


Message

This manual on Rice Production Enhancement Program reflects the government's sincerity to put plans and visions into concrete actions toward economic recovery based on social justice and equity. Moreover, it signifies our determination to give the Filipino farmer the full support and attention he deserves so that he can increase his income and enjoy a better quality of life.

Our commitment to the Filipino farmer is reinforced by RPEP and its implementation. We shall continue to pursue a policy environment that encourages the farmer's creativity and initiative, where he is at the center of the decision-making process and where he can have access to water, technology, credit and market infrastructures. Our goal remains the same: to make farmers profitable.

The contribution of this manual may be modest compared to the complex requirements we have to fulfill in achieving economic recovery and sustained development. Nevertheless, this is a vital undertaking which will help facilitate the development of our farmers.



CARLOS G. DOMINGUEZ
Secretary

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**REGULAR TECHNOGUIDE FOR RICE PRODUCTION
ENHANCEMENT PROGRAM
NOVEMBER, 1987 – APRIL, 1988**

1. Choosing the Rice Variety to Plant (Refer to Appendix A).

The following are the recommended varieties:

For Luzon and Visayas, (except Bicol and Leyte):

IR36, IR42, IR50, IR54, IR56, IR58, IR60, IR62, IR64, IR66, UPL Ri4, BPI Ri4, and BPI Ri10.

For Bicol and Leyte:

IR36, IR56, IR60, IR62, and IR66.

For Palawan:

IR 13149 (Stop-gap variety against black bug)

For Mindanao:

IR56, IR60, IR62, and IR66.

Note: IR36 and IR66 may be used outside Luzon and Visayas provided the fields are monitored regularly for presence of Green Leafhopper and Rice Tungro Virus (RTV) (See Appendix G and G-L).

2. Raising seedlings

Germinating seeds: Soak seeds for 24 hours in running water or in clean water placed in suitable container. Then, incubate seeds for 36-48 hours by placing them in a tied sack filled to half its capacity. To keep seeds uniformly moist and warm, sprinkle and turn sack several times during incubation period.

Seedbed preparation and care: A good seedbed site must be far from rice fields infected with tungro, grassy stunt and other diseases. It should not be lighted at night to avoid attracting adult stemborers, brown planthoppers, and green leafhoppers. Avoid using the same area used as seedbed before.

Wet seedbed: Prepare puddled plots 1 to 1½ meters (m) wide of any convenient length. A total plot area of 400 square meters (sqm) is needed to sow 44 kg of seeds (one sack) to be transplanted in a one-hectare field. Apply butachlor

in the seedbed 1-3 days before sowing.

Sow seeds uniformly at about 1 kg seeds per 9 sqm. After seeds have attained 2 to 3 cm sprouts, begin shallow but continuous irrigation. Gradually increase water depth to 5 cm as seedlings grow taller.

Visit your seedbed each week. When *more than half the leaves* are damaged, determine the insect responsible and spray once using appropriate insecticide found in Appendix B.

Transplant seedlings at the following days: 16 to 18 days old for varieties maturing up to 115 days; 18 to 20 days old for varieties that mature in 116 to 125 days; and 20 to 25 days old for those which mature in 126 days or more.

Dapog seedbed: Sow germinated seeds on cemented floor or levelled soil covered with banana leaves, plastic sheet or heavy coarse paper. Sow seeds at the rate of 1 kg/sqm or 60 kg for 60 sqm plot needed for one hectare field. Continuous watering is needed. Dapog grown seedlings are ready for transplanting 10 to 14 days after sowing (DAS).

Protect seedlings from insect pests, particularly green leafhoppers and brown planthoppers, by applying appropriate insecticides found in Appendix B.

3. Plowing or Rotovating. Before plowing or rotovating, irrigate soil to soften it. Clean and repair all dikes to minimize water seepage and at the same time destroy rat dwellings.

For ricefields which are very weedy or with plenty of stubbles, start land preparation 2-3 weeks before transplanting to allow these materials to decompose. Fields which are relatively clean maybe plowed or rotovated 1-2 weeks before transplanting.

After plowing or rotovating, flood field to minimize loss of nitrogen and to reduce further growth of weeds.

4. Harrowing. Within 3 to 5 days after plowing, harrow fields to break up clods and puddle soil while burying weeds. Keep field flooded with about 5 cm of water. After 5 to 7 days, harrow field again to fully puddle the soil and

make it relatively level. Again, be sure to maintain the field flooded.

Finally, level field very well for efficient weed control and irrigation management.

5. Fertilizer Management. One or two days before transplanting, drain all water from the field. Broadcast required amount of basal fertilizers onto the mud and thoroughly incorporate into soil by harrowing.

The following applications/methods of the fertilizers can be followed based on the number of bags to be used:

- a. For 4 bags of urea — incorporate 2½ bags as basal during last harrowing. Topdress remaining 1½ bags 5 to 7 days before panicle initiation or 50 DAS for the very early-maturing varieties and 60 to 70 DAS for late-maturing varieties.
- b. For more than 4 bags of urea -- incorporate 2½ bags as basal during last harrowing. Topdress 1 bag after weeding or 20-30 days after transplanting (DAT). Apply remaining 1½ bags or more into 5 cm or less of water 5 to 7 days before panicle initiation or 50 DAS for very early-maturing varieties and 60-70 DAS for late-maturing varieties.
- c. For areas where Phosphorus is deficient — use 1 bag of Urea, and 2 bags of Ammonium Phosphate (16-20-0) for basal application. Topdress remaining urea fertilizers as in (a) or (b) above.
- d. For Zinc (Zn)-deficient areas, apply 10-15 kg ZnSO₄/ha as basal during last harrowing. Topdress remaining urea fertilizers as in (a) or (b) above.
- e. The use of farm-produced organic materials is highly recommended in irrigated areas where its suitability had already been established (refer to Appendix C for Azolla Technology).

6. Transplanting

Spacing. The 20cm x 20cm, 20cm x 15 cm, and 20cm x 10cm are generally recommended.

Number of seedlings per hill. If wetbed method of raising seedlings was used, transplant 2 to 3 seedlings per hill at a

depth of 2 to 3 cm. If dapog method was used, transplant 3 to 4 seedlings per hill at a depth of 2 cm.

7. **Rat control.** Observe general cleanliness in the surroundings of rice crop and practice sustained baiting (see Appendix D) immediately after transplanting until 2 weeks before harvest.

If rat population is high, use single dose or acute poison in consultation with your Agriculture and Food Technician (AFT). Acute rodenticides, like zinc phosphide, are highly toxic to humans and domestic animals and should be employed only on selective basis or as part of an organized effort supervised by government technicians.

8. **Water Management, Replanting and Weed Control.** Three days after transplanting (DAT), start irrigating field to a depth of 2 cm. Gradually increase level up to 5 cm as crop grows taller. Avoid deeper flooding to prevent nutrient loss through excessive percolation and seepage. Maintain water level until at least 2 weeks after flowering.

At 3-4 DAT, apply any of recommended pre-emergence herbicides at their precise rates (See Appendix E and F). For maximum results, maintain 5 cm water for at least 2 weeks after applying herbicides.

From 10 DAT, replant all missing hills. Maintain crop with complete stand (no missing hills) and remove weeds. Weeds make the most reduction in crop yield during the first 40 days after transplanting (DAT). Control of weeds at an earlier age will result in higher yields.

9. **Protection from Insect Pests and Diseases.** During the vegetative stage, it maybe necessary to protect rice crop from insect pests, such as whorl maggots, green leafhoppers, brown planthoppers, stemborers and leaffolders. Green leafhopper is the vector of tungro. Brown planthopper causes hopperburn and transmits ragged stunt and grassy stunt viruses, while stemborers cause deadhearts and whiteheads.

Closely monitor your field at least once a week for presence of insect pests, beneficial insects, and pests

damage. Apply appropriate insecticides if needed based on the economic threshold levels shown in Appendix G.

10. Harvesting and Drying. When at least 80% of the grains have turned yellow, your crop is ready for harvest.

Thresh, clean and dry palay promptly to ensure quality grains. It will take 2 to 3 days of drying under the sun, or 8 to 12 hours by means of mechanical dryer to attain 14% moisture content.

11. Work Schedule: Refer to Appendix H.



Rice ripens within 27 to 30 days after flowering. When at least 80% of the grains in the panicle have turned yellow, your crop is ready for harvest.

Thresh the harvest immediately. Threshing should be done not more than 3 days after cutting especially during rainy season to prevent deterioration of grain quality and viability.

**DOUBLE CROP TECHNOGUIDE FOR
RICE PRODUCTION ENHANCEMENT PROGRAM
(NOVEMBER, 1987 – APRIL, 1988)**

General Considerations

1. **WSR-DT (Wet-Seeded Rice-Delayed Transplanting).** If the wet season crop will be harvested on or before November 15, the cropping pattern to be followed is Wet-Seeded Rice (WSR)-Delayed Transplanting (DT).
2. **DT-WSR (Delayed Transplanting-Wet Seeded Rice).** However, if the wet season crop will be harvested after November 15, then the cropping pattern to be followed will be DT-WSR.
3. **DT-DT (Delayed Transplanting-Delayed Transplanting).** In both cases, the farmer can resort to DT-DT cropping pattern.
4. **Varieties.** In all cases, the varieties to be used must be early-maturing (105-115 days).
5. **The wet season crop must be harvested closest to the ground.** Clear the field of straw immediately to facilitate land preparation.
6. **Delayed Transplanting Rationale.** For DT, establish the seedbed 20 days before harvesting wet season crop or WSR crop. Transplanting seedlings at the latest age limit has the advantage of shortening the field duration of rice crop and could be harvested within 75 to 85 days. This enables you to further intensify cropping and cut on water use while reducing exposure of rice crop to field environmental risks such as pests. If you follow strictly the cultural practices for delayed transplanting, you will get as much yield as when you transplant earlier.

WET SEEDED RICE (WSR)

1. **Choosing the rice variety to plant (Refer to Appendix A).**

The following are the recommended varieties:

For Luzon and Visayas (except Bicol and Leyte):

IR36, IR50, IR56, IR58, IR60, IR62, IR64, IR66, UPL Ri4, and BPI Ri-10.

For Bicol and Leyte:

IR36, IR56, IR60, IR62 and IR66.

For Palawan:

IR13149 (Stop-gap variety against black bug).

For Mindanao:

IR56, IR60, IR62 and IR66.

Note: IR36 and IR66 may be used outside Luzon and Visayas provided fields are monitored regularly for presence of green leafhopper and rice tungro virus (See Appendix G and G-1).

2. **Raising Seedlings.** Soak 100 kg clean seeds with at least 85% germination for 24 hours in clean water. Then incubate seeds for 24-36 hours by placing them in a tight half-filled sack.

3. **Plowing or Rotovating.** Before plowing or rotovating, irrigate soil to soften it. Clean and repair all dikes to minimize water seepage and at the same time destroy rat dwellings.

For ricefields which are very weedy or with plenty of stubbles, start land preparation 2 weeks before seeding to allow these materials to decompose. Fields which are relatively clean maybe plowed or rotovated 1 week before seeding.

After plowing or rotovating, flood the field to minimize loss of nitrogen and to reduce further growth of weeds.

4. **Harrowing.** Within 3 to 5 days after plowing, harrow fields to break up clods and puddle the soil while burying weeds. Keep the field flooded with about 5 cm of water. After 5 to 7 days, harrow field again to fully puddle the soil and make it relatively level. Again, be sure to maintain the field flooded.

Finally, level the field very well for efficient weed control and irrigation management.

5. **Fertilizer Management.** One or two days before seeding, drain all water from the field. Apply the required amount of basal fertilizers onto the mud and thoroughly incorporate into the soil.

The following methods can be followed based on the number of bags to be used:

a. For 4 bags of urea — incorporate 2½ bags as basal during the last harrowing. Topdress the remaining 1½ bags at 5 to 7 days before panicle initiation or 50 DAS for the

very early maturing varieties and 60 to 70 DAS for late maturing varieties.

- b. For more than 4 bags of urea, incorporate 2½ bags as basal during the last harrowing. Topdress 1 bag after weeding or 20-30 days after seeding (DAS). The remaining 1½ bags or more is applied into 5 cm of water 5 to 7 days or less before panicle initiation or 50 DAS for the very early maturing varieties and 60-70 DAS for late maturing varieties.
- c. For areas where Phosphorus is deficient – use 1 bag of urea and 2 bags Ammonium Phosphate (16-20-0) for basal application. Topdress the remaining urea fertilizers as in (a) or (b) above.
- d. For Zn deficient areas, apply 10-15 kg ZnSO₄/ha as basal during the last harrowing. Topdress the remaining urea fertilizer as in (a) and (b) above.
- e. The use of farm produced organic materials is highly recommended in irrigated areas where its suitability had already been established (refer to Appendix C for Azolla technology).

6. **Broadcast Seeding.** Drain the field and broadcast uniformly the pre-germinated seeds one day after levelling.

7. **Weed Control, Replanting, and Water Management.** One day before seeding, spray appropriate pre-emergence herbicide as shown in Appendix E and F. Apply 2,4-D or MCPA, 25-30 days after seeding if broadleaves and sedges persist.

Irrigate the field 6 to 8 days after seeding to a depth of 1 cm. Gradually increase to 5 cm as the crop grows taller. Avoid deeper flooding to prevent nutrient loss through excessive percolation and seepage. Maintain farm ditches well shaped to allow quick flow of irrigation water with minimum loss. This is important because rice plants are extremely sensitive to lack of water especially from panicle initiation to one week after flowering (50-65 DAS).

The thinly populated areas/portions must be replanted with seedlings from the thickly populated areas. Maintain crop with complete stand and remove weeds. Control of weeds at an early age will result in higher yields.

8. **Rat Control.** Observe general cleanliness in the surroundings of the rice crop and practice sustained baiting (See Appendix D)

immediately after transplanting until 2 weeks before harvest.

If rat population is high, use single-dose or acute poison in consultation with your Agriculture and Food Technician (AFT). Acute rodenticides like zinc phosphide are highly toxic to humans and domestic animals and should be employed only on selective basis or as part of an organized effort supervised by government technicians.



9. Protection from Insect Pests and Diseases. During the vegetative stage, it maybe necessary to protect the crop from insect pests such as whorl maggots, green leafhoppers, brown planthoppers, stemborers and leaffolders. Green leafhopper is the vector of tungro. Brown planthopper causes hopperburn and transmits ragged stunt and grassy stunt viruses, while stemborers cause deadhearts and whiteheads.

Closely monitor your field at least once a week for the presence of insect pests, beneficial insects, and pests damage. Apply appropriate insecticides if needed based on the economic threshold levels shown in Appendix G.

10. Harvesting and Drying. When at least 80% of the grains have turned yellow, your crop is ready for harvest.

Thresh, clean and dry paddy promptly to ensure quality grains. It will take 2 to 3 days of drying under the sun, or 8 to 12 hours with the use of a mechanical dryer to attain 14% moisture content.

DELAYED TRANSPLANTING (DT)

1. Choosing the rice variety to plant (Refer to Appendix A).

The following are the recommended varieties:

For Luzon and Visayas (except Bicol and Leyte):

IR36, IR50, IR56, IR58, IR60, IR62, IR64, IR66, UPL Ri4, and BPI Ri10.

For Bicol and Leyte:

IR36, IR56, IR60, IR62, and IR66.

3. Plowing or Rotovating. Before plowing or rotovating, irrigate soil to soften it. Clean and repair all dikes to minimize water seepage and at the same time destroy rat dwellings.

For ricefields which are very weedy or with plenty of stubbles, start land preparation 2-3 weeks before transplanting to allow these materials to decompose. Fields which are relatively clean maybe plowed or rotovated 2 weeks before transplanting.

After plowing or rotovating, flood field to prevent loss of nitrogen and to stop further growth of weeds.

4. Harrowing. Within 3 to 5 days after plowing, harrow fields to break up clods and puddle soil while burying weeds. Keep field flooded with about 5 cm of water. After 5 to 7 days, harrow field again to fully puddle soil and make it relatively level. Again, be sure to maintain the field flooded.

Finally, level field very well for efficient weed control and irrigation management.

5. Fertilizer Management. One or two days before transplanting, drain all water from the field. Apply required amount of basal fertilizers onto the mud and thoroughly incorporate into the soil.

The following methods can be followed based on the number of bags to be used:

- a. For 4 bags of urea — incorporate 2½ bags as basal during last harrowing. Topdress remaining 1½ bags 5 to 7 days before panicle initiation or 50 DAS for the very early-maturing varieties and 60 to 70 DAS for late-maturing varieties.

For Palawan:

IR 13419 (stop-gap variety against black bug).

For Mindanao:

IR56, IR60, IR62, and IR66 .2.

Note: IR36 and IR66 may be used outside Luzon and Visayas provided fields are monitored regularly for presence of green leafhoppers and rice tungro virus (See Appendix G and G-1).

Raising Seedlings

Germinating Seeds. Soak seeds for 24 hours in running water or in clean water placed in suitable container. Then, incubate seeds for 36-48 hours by placing them in tied haf-filled sack. To keep seeds uniformly moist and warm, sprinkle and turn sack several times during incubation period.

Seedbed Preparation and Care. A good seedbed site must be far from rice fields infected with tungro, grassy stunt and other diseases. It should not be lighted at night to avoid attracting adult stemborers, brown planthoppers, and green leafhoppers. Avoid using the same area used as seedbed before.

Prepare puddled plots 1 to 1½ meters wide of any convenient length. A total plot area of 400 square meters is needed to sow 50 kg of seeds to be transplanted in a one-hectare field. Apply Butachlor in seedbed 1-3 days before sowing. Sow seeds uniformly at about 1 kg per 8 s. m. After seeds have attained 2 to 3 cm sprouts, begin shallow but continuous irrigation. Gradually increase water depth to 5 cm as seedlings grow taller.

Visit your seedbed each week. When *more than half the leaves* are damaged, determine the insect responsible and spray once using the appropriate insecticide indicated in Appendix B. Transplant seedlings after 35-40 days from sowing.

- b. For more than 4 bags of urea — incorporate 2½ bags as basal during the last harrowing. Topdress 1 bag after weeding or 10-15 days after transplanting (DAT) for the very early-maturing varieties and 20-30 DAT for late-maturing varieties. Apply remaining 1½ bags or more 5 to 7 days before panicle initiation or 50 DAS for very early-maturing varieties and 60-70 DAS for late-maturing varieties.
- c. For areas where Phosphorus is deficient — 2 bags of urea for basal application can be replaced by two bags of

Ammonium Phosphate (16-20-0). Topdress remaining urea fertilizers in (a) and (b) above.

- d. For zinc (Zn)-deficient areas — apply 10-15 kg ZnSO₄/ha as basal during the last harrowing. Topdress remaining urea fertilizers in (a) and (b) above.
- e. The use of farm produced organic materials is highly recommended in irrigated areas where its suitability had already been established (refer to Appendix C for azolla technology).

6. **Transplanting.** Transplant 5-6 seedlings per hill spaced 20 x 15 and 20cm x 10cm at a depth of 2 to 3 cm.

7. **Rat Control.** Observe general cleanliness in the surroundings of rice crop and practice sustained baiting (See Appendix D) immediately after transplanting until 2 weeks before harvest. If rat population is high, use single-dose or acute poison in consultation with your Agriculture and Food Technician (AFT). Acute rodenticides like zinc phosphide are highly toxic to humans and domestic animals and should be employed only on selective basis or as part of an organized effort supervised by government technicians.

8. **Water Management, Replanting and Weed Control.** Three days after transplanting (DAT), start irrigating the field to a depth of 2 cm. Gradually increase the level up to 5 cm as the crop grows taller. Avoid deeper flooding to prevent nutrient loss through excessive percolation and seepage. Maintain water level until at least 2 weeks after flowering.
At 3-4 DAT, apply any of the recommended pre-emergence herbicides at their precise rates (See Appendix E and F). For maximum results, maintain 5 cm water for at least 2 weeks after applying herbicides.
From 10 DAT, replant all missing hills. Maintain crop with complete stand (no missing hills) and remove weeds. Weeds make the most reduction in crop yield during the first 40 days after transplanting (DAT). Control of weeds at an earlier age will result in higher yields.

9. **Protection from Insect Pests and Diseases.** During vegetative stage, it maybe necessary to protect the crop from insect pests such as whorl maggots, green leafhoppers, brown planthoppers,

stemborers, and leaffolders. Green leafhopper is the vector of tungro. Brown planthopper causes hopperburn and transmits ragged stunt and the grassy stunt viruses, while stemborers cause deadhearts and whiteheads.

Closely monitor your field at least once a week for the presence of insect pests, beneficial insects, and pests damage. Apply appropriate insecticides if needed based on the economic threshold levels shown in Appendix G.

10. **Harvesting and Drying.** When at least 80% of the grains have turned yellow, your crop is ready for harvest.

Thresh, clean and dry paddy promptly to ensure quality grains. It will take 2 to 3 days of drying under the sun, or 8 to 12 hours with the use of a mechanical dryer to attain 14% moisture content.

11. **Work Schedule:** Refer to Appendix I, J, and K.

APPENDICES

Appendix A. Characteristics of recommended rice varieties in the Philippines.

Character	For Lowland Irrigated Rice Fields										BPI- Ri-10
	IR 36	IR 42	IR 50	IR 54	IR 56*	IR 58	IR 60*	IR 62*	IR 64	IR 66	
Height (cm)	85	110	80	95	84	61	90	88	105	88	87
Maturity (day)	110	130	107	120	108	100	110	110	113	109	113
Lodging	R	R	R	R	R	R	R	R	—	R	R
Blast	MR	MR	S	S	R	R	R	R	MR	R	MR
Bacterial leaf blight	R	R	R	R	R	R	R	R	—	R	S
Tungro virus	MR	MS	R	R	R	R	R	R	MR	R	R
Grassy stunt virus	R	R	R	R	R	R	R	R	—	S	R
Ragged stunt	R	R	R	R	R	R	R	R	MR	R	R
Brown planthopper	R	R	R	R	R	R	R	R	MR	R	MR
Green leafhopper	MR	MR	R	R	R	R	R	R	MR	R	MR
Stemborer	MR	MR	MR	MR	MR	MR	MR	MR	—	R	MR
Whorl maggot	S	S	S	S	S	S	S	S	—	MR	MR
Problem soils									—	S	S
Salinity	R	MR	MR	MR	MS	MS	MS	MR	—	—	—
Strong acidity	R	MR	R	R	R	R	R	MS	—	—	—
P deficiency	MS	R	MR	R	R	R	R	MR	—	—	—
Zn deficiency	R	MR	R	R	R	R	R	MR	—	—	—

MR — Moderately resistant; MS — Moderately susceptible; R — Resistant; S — Susceptible;

— Intermediate; * — Recommended for Mindanao due to high RTV incidence.

Appendix B. Interagency Insecticide Recommendations for Lowland Rice in the Philippines a/

Common Name of Chemical	Approved Brand Names	Effective against these insects	Kg. active ingredient (a.i.) per hectare	Kg. Granule/ha. or Tablespoon (10 cc) / 16 Liters 16 Liters (4 gal. sprayer)
Granules: G				
carbofuran 3*	Furadan 3G	whorl maggot, green leafhopper, brown & white-backed planthopper, stemborers, leaffolder, rice caseworm	1.0 kilo	34 kilos
cartap 4+MIPCS	Supergran 9G	green leafhopper, stemborers	1.0 kilo	12 kilos
diazinon 5*	Basudin, Dianol, Diagran 5G	green leafhopper, brown & white-backed planthopper, stemborers	1.0 kilo	20 kilos
endosulfan	Thiodan 5G	stemborers	1.0 kilo	20 kilos
Phentoate 3+MIPCS3	Carbophen 6G	green leafhopper, brown planthopper	1.0 kilo	16 kilos
Liquids: EC (emulsifiable concentrate), WSC (water soluble concentrate), QK (quick knockdown)				
azinphos ethyl	Bionex, Cottnion	green leafhopper, stemborers, leaffolder caseworm, armyworm	0.4 kilo	.15 tbsp.
BPMC (Bassa) 50EC	Baycarb, Carvil Hopcin	green leafhopper, brown & white-backed planthopper, leaffolder	0.4 kilo	1.3 tbsp.
chlorpyrifos 21 +	Brodan EC	green leafhopper, brown & white-backed planthopper, stemborers, leaffolder, caseworm, armyworm	0.4 kilo	4.0 tbsp.
BPMC 105 EC				

carbophenothion 48EC	Trithion	green leafhopper, brown & white-backed planthopper, rice bug	0.4 kilo	1.3 tbsp.
diazinon 20EC*	Basudin EC	stemborers, leaffolder, rice caseworm, rice bug, armyworm	0.4 kilo	3.0 tbsp.
endosulfan 35 EG	Thiodan	green leafhopper, stemborers, pink stemborer, leaffolder, rice caseworm, rice bug	0.4 kilo	1.5 tbsp.
monocrotophos 30EC*	Azodrin 202 R, Nuvacron WSC	whorl maggot, green leafhopper, brown & white-backed planthoppers, stemborers, pink stemborer, leaffolder, caseworm, rice bug, cutworm, looper	0.4 kilo	3.0 tbsp.
phosphamidon 50 WSC	Dimecron WSC	stemborers, pink stemborer, leaffolder, caseworm, rice bug	0.4 kilo	1.5 tbsp.
triazophos 40EC*	Hostathion EC	whorl maggot, green leafhopper, stemborers, pink stemborer, leaffolder, caseworm, rice bug	0.4 kilo	1.5 tbsp.
carbaryl 48F	Sevin XLR	caseworm, green leafhoppers	0.5 kilo	3.5 tbsp.
Wettable Powder: WP, Soluble Powder: SP				
carbaryl 853	Carbin Tercyl, Sevin	green leafhopper, rice bug, armyworm	0.75 kilo	1.5 tbsp.
MIPC 50 wp	Etrofolan, Hytox, Mipcin WP	green leafhopper, brown & white-backed planthopper, rice bug	0.4 kilo	3.0 tbsp.
MIMC 50 wp	Tsumacide	green leafhopper, brown & white-backed planthoppers	0.4 kilo	2.0 tbsp.
acephate 75 SP	Orthone SP	green leafhopper, brown & white-backed planthoppers, rice bug	0.4 kilo	2.0 tbsp.
BPMC 40 WP	Shellcarb SP	green leafhopper, brown & white-backed planthoppers, leaffolder	0.4 kilo	2.0 tbsp.

* This insecticide may stimulate an increase in brown planthopper population at the reproductive stage of the crop and should not be applied 40 days after transplanting.

a/ All FPA approved chemicals are acceptable under the Rice Production Enhancement Program (PEP), November 1987 to April 1988.

Appendix C. USING AZOLLA IN RICE CULTURE

Azolla is an excellent source of nitrogen for lowland rice farming. As an organic fertilizer, it has long been used in the rice lands of China, Korea, and Vietnam. In the Philippines, it can be used to supply about half of the nitrogen fertilizer requirement.

Azolla is a tiny aquatic fern that grows in ponds, ditches, canals and other water surfaces. Its importance as fertilizer derives from its symbiotic relationship with a blue-green algae, *Anabaena azollae*, which lives in the cavites of azolla leaves and which fixes nitrogen from the atmosphere. When azolla is grown in the rice paddies and then incorporated in the soil as green manure, its nitrogen content is released upon decomposition and can be used by the rice crop.

Soil Suitability to Azolla

For fast growth of azolla, ricefield must contain at least 20 ppm of available phosphorus. You can check with the nearest Soil Laboratory of the Department of Agriculture to find out if the soil in your locality has the right amount of phosphorus. Azolla may also be grown in soils with lower levels of phosphorus, but the rate of growth is slower.

In the absence of soil analysis data, you can make your own test of the suitability of soil to azolla, as follows:

1. Make a 2 sq.m. (1 x 2 m) plot in the rice paddy.
2. Flood the plot with water 2-5 cm deep.
3. Broadcast 1 kg of fresh azolla on the plot.
4. Find out how many days it takes for the azolla to cover the plot fully. The number of days it takes for 1 kg of azolla to spread over entire plot is considered the doubling time of azolla in that particular soil. If doubling time is from 4 to 6 days, the soil has enough phosphorus and is well-suited to azolla, that is, if there are no symptoms of microbial diseases or insect pests.

The Inoculum Pond

It is best for the farmer to have his own inoculum pond that will provide him with a continuous supply of azolla for every cropping. Five kg of azolla is enough to start a pond.

Here's how to make an inoculum pond:

1. Build a dike at least 15 cm. high around a 40 sq.m. area to

keep in 2 to 5 cm of pond water at all times. Since the pond must be continuously flooded, locate it near a source of constant water supply.

2. Seed the pond with 5 kg of azolla and let it grow until pond is fully covered, which may take from 20 to 40 days. Pond will have at least 60 kg of azolla when fully covered.
3. To control insect pests, broadcast Carbofuran granules on the water at the rate of 0.75 to 1.0 active ingredient a.i./ha (100-130 gm/40 sq.m. pond to Furadan 3G) every week.

Methods of Utilizing Azolla

There are three methods of producing and utilizing azolla on one hectare of lowland rice farm: the *tatluhan*, *dalawahan*, and *isahan* methods. The choice of method to use depends on the water supply drainability of the paddles, doubling time of azolla and cultural practice on the farm. The best method should provide the most nitrogen in one cropping given the conditions in the ricefield. Note that the *dalawahan* and *tatluhan* methods require incorporation of azolla into the soil using a rotary weeder.

The table below may be used as guide in selecting the method best suited to the field:

CONDITION IN FIELD METHOD

Water Supply	Drainage	Azolla Doubling Time	1st Choice	2nd Choice	3rd Choice
Good	Good	Fast ^{1/}	Tatluhan	Dalawahan	Isahan
Good	Good	Moderate ^{2/} to slow ^{3/}	Dalawahan	Isahan	—
Good	Poor	Fast to slow	Isahan	—	—
Poor	Good or poor	Fast to slow	Isahan	—	—

1/ 4 to 6 days

2/ 7 to 9 days

3/ more than 9 days

Tatluhan Method

If the ricefield has a steady supply of water, good drainage and enough phosphorus, the best way of producing and utilizing Azolla is the *tatluhan* method. Azolla is grown in the paddy and incorporated into the soil at least three times: 1) during final levelling or basal fertilization and insecticide incorporation, 2) during first weeding, and 3) during land preparation for the next crop.

Directions for the *tatluhan* method are as follows:

1. Start seeding the field uniformly with azolla from the inoculum pond when irrigation becomes available or at least 40 days before transplanting. Leave at least 1 kg in pond to multiply for the next seeding.
2. Make sure that paddies are flooded to float azolla and then plowed once and harrowed twice at weekly intervals before final levelling.
3. Twenty days before transplanting rice seedlings, or as early as plowing time, gather again the azolla from inoculum pond and broadcast it evenly on a one-hectare area. Leave at least 1 kg in the pond to multiply for future use.
4. One day before transplanting, drain all water from paddies and apply basal fertilizer and insecticide onto the mud and thoroughly incorporate together with azolla. However, at three days after transplanting, start irrigating the field to about 2 cm deep to float remnant azolla and gradually increase the level up to 5 cm as the rice crop grows taller. Re-seed field with azolla from inoculum pond.
5. Transplant seedlings according to the technoguide.
6. Let azolla grow for 20 days.
7. Incorporate azolla in the soil with rotary weeder. The incorporation should coincide with the first weeding.
8. Allow remaining azolla plants to grow and, if necessary, re-seed field with azolla from inoculum pond.
9. Let surviving azolla plants multiply further until harvest time. Turn them under during land preparation for the next cropping.

Dalawahan Method

The *dalawahan* method is best used when land preparation will be done in less than 2 weeks before transplanting and/or when growth rate of azolla is below normal because of insufficient phosphorus. Azolla is grown with rice and incorporated twice: during

weeding 20 days after transplanting and then again during land preparation for the next crop.

Directions for the *dalawah* method are below:

1. Follow steps 1 to 3 and then 5 to 6 in the tatluhan method.
2. Allow remaining azolla to multiply further or re-seed field with azolla from inoculum pond to increase biomass production.
3. Turn azolla under during land preparation for the next cropping.

Isahan Method

In the *Isahan* method, azolla is grown with the rice crop but is not incorporated during cropping. It is best used where the doubling time of azolla is slow, where paddies cannot be drained, or where water supply is inadequate. The biomass is incorporated only once: during land preparation for the following crop. It is this next crop that will directly benefit from azolla.

Steps in the Isahan method are, as follows:

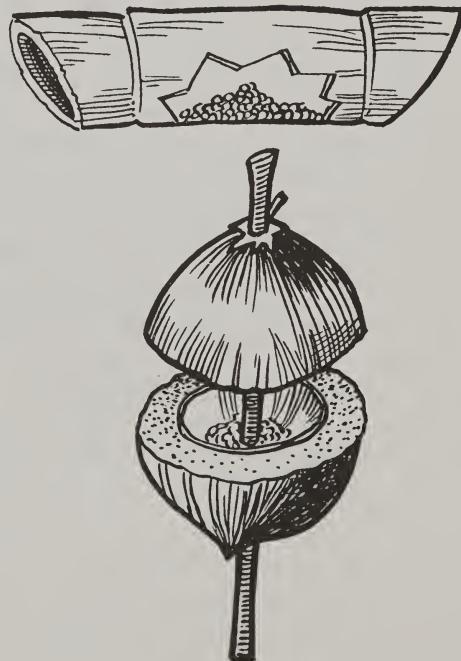
1. Prepare land, apply basal fertilizer and insecticides, and transplant seedlings according to the Technoguide.
2. Seven days after transplanting, gather azolla from inoculum pond and broadcast uniformly over one-hectare area. Leave at least 1 kg in pond to multiply for future use.
3. After 80 days in the field, the 60 kg of azolla will have increased to about 15,000 kg. Maintain the rice crop and control weeds with rotary weeder or by handweeding. Do not drain paddies to prevent dehydration and death of the azolla.
4. Allow azolla to multiply until harvest time or as long as there is sufficient moisture. Incorporate it during land preparation for the next cropping.
5. Repeat steps 1 to 4 during the next cropping.

Appendix D. Recommended practices for sustained rat baiting.

- a. For every hectare of ricefield, choose five baiting locations or stations. These locations should be at least 50 meters apart. Good baiting locations are dike intersections of canal banks and along dikes.
- b. Select rodenticides to use. Chronic rodenticides are recommended since they can kill slowly but effectively. Some rodenticides and their mixing ratio are shown below:

Rodenticide	Formulation (%)	Mixing Ratio ^{1/}	
		Parts	Chemical Toxicant: Bait
1. Ratoxin	0.50		1:19
2. Racumin	0.75		1:19
3. Tomorin	1.00		1:40
4. Diphacionone	0.10		1:31
5. Liphadione	0.25		1:50

- 1/ The ratio 1:19 means that for one part toxicant, there are 19 parts of baiting materials (e.g. low grade milled rice, "binlid", etc.).



- c. Put 6 tablespoons of poisoned bait in an appropriate container (can, bamboo, coconut husks, etc.). After 3 or 4 days, check bait containers. If all bait has been eaten at one location, place two additional containers and place 6 tablespoons of bait in each of 3 containers. Check again in 3 to 4 days. If bait is gone, place 3 additional containers at locations where this happened and maintain approximately 6 tablespoons of bait.
- d. Continue to check bait containers twice a week. If rats continue to consume most of the bait at some feeding stations, place increasing amounts of bait in each active station. A one-liter can will hold up to 18 tablespoons. Try to anticipate consumption so that bait will be left in containers each time you check and add extra containers if necessary. This is important: if bait is not available after rats have learned to come to the feeding stations, there maybe heavy feeding on nearby plants.
- e. Remove moldy or wet baits and refill empty bait containers. Replace consumed baits in containers with sound baits.
- f. Withdraw all baits two weeks before harvest.

Appendix E. Recommended Herbicides for transplanted rice and their effectiveness against different weed species in the Philippines¹

Herbicide	Time of Application ^{2/}	Rate kg/ha	Weed Species
Butachlor	Pre	1.0	<i>Echinochloa</i> spp
Butachlor 4-D Tank Mixed	Pre	0.75+0.5	<i>Lepetochloa chinensis</i>
2,4-D or MCPA	Pre, Post at 16 to 17 days	0.8 0.8	<i>Pimperstyliis littoralis</i>
Thiobencarb	Pre or Early post	1.0	<i>Cyperus difformis</i>
Thiobencarb +2, 4-D	Pre or Early post	0.8+0.4	<i>Cyperus iria</i>
Piperophos + 2,4-d	Pre or Early post	0.6+0.4	<i>Ludwigia octovalvis</i>
Trifluralin +2,4-D	Post at 20	1.5	<i>Sphacelaea zeynaliica</i>
Bentazon			<i>Scleria maritimus</i>

1/ All FPA approved chemicals are acceptable under the Rice Production Enhancement Program (RPEP),
November 1987 to April 1999

Legend: x — susceptible herbicide
y — tolerant to herbicide
z — partially tolerant to herbicide
November, 1981 to April, 1980.

Appendix F. Recommended Herbicides for weed control in transplanted rice in the Philippines 1/

Common Name	Brand Name	Formulation Type	% Active Ingredient
Butachlor	Lambast 600 Lambast	Liquid Granule Liquid Granule	60 5 60 5
Bentazon 2,4-D	Basagran 50	Liquid	50
IPE	Ciba-Geigy 2,4-D Hedonal G Weedtrol G	Granule Granule	3.2 3.2
	Atlas 2,4-D Hoechst 2,4-D Planters 2,4-D Ciba Geigy 2,4-D Shell 2,4-D Hoechst 2,4-D EC Ciba Geigy 2,4-D EC Weedtrol EC AgChem 2,4-D	3.2 3.2 3.2 3.2 3.2 40 40 40 40	
	Hedonal	Liquid	40
	Amine		40

Hoechst	Liquid	50
Weedtrol	Liquid	40
Planters	Liquid	40
WB 2,4-D Damine	Liquid	48
U 46-D	Liquid	50
Hedonal	WP	80
Agroxone 6G	Granule	40
Agrozone S	Liquid	40
Hedonal M	Liquid	40
Hoechst	Liquid	40
Saturn 60 EC		50
Saturn 5G		
Saturn D	Granule	5
Thiobencarb		
+2,4-D		
Trifluralin	Treflan R	4+2
Piperophos	Granule	1.67+2.13
+2,4-D	Liquid	33+17%

1/ All FPA approved chemicals are acceptable under the Rice Production Enhancement Program (RPEP)
 November, 1987 to April, 1988.

Appendix G. Suggested Economic Threshold Level (ETL) or action threshold for insect pests of rice in the Philippines.

Growth stage/Insect pest	ETL	Consideration
All Growth Stages		
Planthoppers	20 hoppers/hill or 1 hopper/tiller	Largely insecticide-induced pests; rarely a problem unless chemical insecticides are unwisely used; determine ETL by sequential sampling (Appendix G-1)
Green Leafhoppers	none	Normally do not build populations to Levels which cause damage; major threat is on rice tungro virus: (RTV) transmission; warning threshold can be based on RTV in ratoons of previous crop confirmed by Iodine test; use resistant varieties and employ synchronous planting.
Defoliators	1 live larva/hill	Do not treat unless live larvae are found; up to 25% defoliation causes no yield loss at early vegetative stage; determine ETL by sequential sampling (Appendix G-2)
Sternborer	more than 20% deadheart or more than 1% whitehead	Usually under natural control by parasites and predators; do not attempt to control by chemical except in unusual case where damage is heavy.

Appendix G. Suggested Economic Threshold Level (ETL) or action threshold for insect pests of rice in the Philippines.

Rice black bug	4 nymphs and/or adult/hill	Only in the island of Palawan; use of tolerant varieties may help contain the problem.
Vegetative Stage Only		
Green semilooper and/or hairy caterpillar	2 live larvae/hill	Rarely reach ETL; heavily parasitized and occur at early stage; when plant can sustain significant foliage loss without yield reduction
Caseworm	30% foliage loss and at	Rarely reach ETL; heavily parasitized and occur at early stage; when plant can sustain significant foliage loss without yield reduction
Whorl maggot	none	Uneconomical to control with current insecticides and prices
Ripening Stage		
Rice bug	3 nymphs and/or adults/sqm.	Tend to aggregate on panicles of crops which mature early or after most crops are harvested; crop synchrony is important for control.

Appendix G-1. Sequential sampling planthoppers and predators for Integrated Pest Management (1PM).

Sample no.	No. hoppers	No. predators	Adj. No. hoppers	Cum. adj. hoppers	Lower limit	Upper limit
1.	—	—	—	—	—	—
2.	—	—	—	—	< 32	> 76
3.	—	—	—	—	< 45	> 89
4.	—	—	—	—	< 59	> 102
5.	—	—	—	—	< 72	> 116
6.	—	—	—	—	< 85	> 129
7.	—	—	—	—	< 99	> 143
8.	—	—	—	—	< 112	> 156
9.	—	—	—	—	< 126	> 169
10.	—	—	—	—	< 139	> 183
11.	—	—	—	—	—	—
12.	—	—	—	—	—	—

Continue sampling

Don't treat

Treat

Appendix G-2. Sequential sampling leaffolders for Integrated Pest Management (IPM).

Sample no.	No. larvae	running total	Lower limit	Upper limit	treat
1.	—	—	—	—	
2.	—	—	—	—	
3.	—	—	—	—	
4.	—	—	—	—	
5.	—	—	—	—	
6.	—	—	—	—	
7.	—	—	—	—	
8.	—	—	—	—	
9.	—	—	—	—	
10.	—	—	—	—	
11.	—	—	—	—	
12.	—	—	—	—	
Don't treat					
1.	—	—	—	—	
2.	—	—	—	—	
3.	—	—	—	—	
4.	—	—	—	—	
5.	—	—	—	—	
6.	—	—	—	—	
7.	—	—	—	—	
8.	—	—	—	—	
9.	—	—	—	—	
10.	—	—	—	—	
11.	—	—	—	—	
12.	—	—	—	—	
Continue sampling					
1.	—	—	—	—	
2.	—	—	—	—	
3.	—	—	—	—	
4.	—	—	—	—	
5.	—	—	—	—	
6.	—	—	—	—	
7.	—	—	—	—	
8.	—	—	—	—	
9.	—	—	—	—	
10.	—	—	—	—	
11.	—	—	—	—	
12.	—	—	—	—	

Appendix H. Work Schedule for Regular Dry Season Crop under Rice Production Enhancement Program (RPEP), November, 1987 to April, 1988

DAS	DAT	ACTIVITIES	DATE
-3	-21	Plow field and soak seeds	
-2	-20	Incubate seeds and construct seedbed	
0	-19	Sow seeds if wetbed method is used	
3	-16	First harrowing of field	
8	-11	Visit wetbed seeded and monitor insect damage	
9	-10	Sow seeds if dapog method is used	
10	-9	Second harrowing of field	
15	-4	Visit seeded and monitor insect damage	
17	-2 or	Drain field and apply basal fertilizer	
	-1	Final harrowing or levelling of field.	
18	-1	Pull seedlings if wetbed method is used	
19	0	Transplant (either dapog or wetbed method)	
21	3	Irrigate field	
22	4	Apply herbicide	
25	7	Monitor field for presence of insect pests, beneficial insects and pest damage. If economic threshold is reached, spray appropriate insecticide.	
28	10	Replant missing hills	
32	14	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide.	
38	20	Handweed if necessary	
39	21	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
48 or	30 or	Topdress fertilizer if early-maturing variety is used.	
58-68	40-50	Topdress fertilizer if medium-maturing variety is used.	
53	35		
60	42		
60	49		
67	56		
74	63		
81	70		
88	77		
101-106	85-90	Drain field	
106-126	90-110	Harvest	

DAS — Days after sowing

DAT — Days after transplanting

Appendix I. Work Schedule for double crop dry season (DT-WS Pattern) under the Rice Production Enhancement Program (RPEP), November 1987 to April 1988.

DAS	DAT	DATE
At Harvest of Wet-Seeded (WS) Crop		
-3	-38	A. Establishment of the 1st Crop (DT)
		Cut stubbles close to the ground and remove all straws from field
-2	-37	Soak seeds
-1	-36	Incubate seeds
0	-35	Construct seedbed
7	-28	Sow seeds in seedbed
14	-21	Visit seedbed and monitor insect damage
14	-21	Plow field
19	-14	Visit seedbed and monitor insect damage
21	-14	First harrowing of field
26	-9	Visit seedbed and monitor damage
28	-7	Second harrowing of field
35	-1	Visit seedbed and monitor insect damage
36	0	Drain field. Apply basal fertilizer.
39	3	Harrow and level field. Pull seedlings.
40	4	Transplant
43	7	Irrigate field
46	10	Apply herbicide
50	14	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide.
56	20	Repplant missing hills.
57	21	Monitor field for the presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide.
61	25	Handweed if necessary
68	32	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide.
75	39	Topdress fertilizer
82	46	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide
89	53	Drain the field
100	64	Harvest
100-115	70-80	

DAS — Days after sowing
 DAT — Days after transplanting

DT — Delayed transplanting
 WSR — Wet seeded rice

Cont. Appendix I (DT-WSR PATTERN)

DAS	DAT	DATE
at Harvest of 1st Crop		B. Establishment of the 2nd Crop (WSR)
		Cut stubbles close to the ground and remove straws from field.
1 DAH	-15	Plow field
7 DAH	-10	First harrowing of field
12 DAH	-5	Second harrowing of field
14 DAH	-5	Soak seeds
15 DAH	-2	Indicate seeds
16 DAH	-1	Drain field and apply basal fertilizers.
	0	Apply herbicide.
		Drain field and broadcast pre-germinated seeds
6-8		Irrigate field to a depth of 1 cm and gradually increase depth to 5 cm as crop grows
7		Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide
14		
21		
28		
30		Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide
30		
35		
42		
49		
50		Topdress fertilizer.
56		Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide
63		
70		
77		
84		Drain field or stop in flow 2 weeks before harvesting.
90-95		Harvest
105-115		

DAH – Days after harvest of the 1st crop

Appendix J. Work Schedule for double crop dry season (WSR-DT Pattern) under the Rice Production Enhancement Program (RPEP), November, 1987 to April, 1988.

DAS	ACTIVITIES	DATE
At harvest of Wet Season Crop	A. Establishment of 1st Crop (WSR) Cut stubbles close to the ground and remove all straws from field	
-14	Plow field	
-10	First harrowing of field	
-5	Second harrowing of field	
-3	Soak seeds	
-2	Incubate seeds	
	Drain field and apply basal fertilizer then harrow and level field	
-1	Apply appropriate pre-emergence herbicides	
0	Drain field and broadcast pre-germinated seeds	
6-8	Irrigate field to a depth of 1 cm and gradually increase depth to 5 cm as crop grows	
7		
14	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
21	Apply 2,4-D or MCPA if broadleaves and sedges persist	
28	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
30	Topdress fertilizer	
35	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
42	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide	
50	Topdress fertilizer	
56	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide	
63	Drain field	
70	Harvest 1st crop (should be closed to the ground)	
77		
84		
90-95		
105-115		

DAS – Days after seeding
WSR – Wet seeded rice

DT – delayed transplanting

Appendix J (WSR-DT PATTERN) Cont.

DAS	DAT	ACTIVITIES	DATE
23 Days Before Harvest (DBH) of 1st Crop		B. Establishment of the 2nd Crop (DT)	
22 DBH	-37	Incubate seeds	
21 DBH	-36	Prepare seedbed	
20 DBH or 0 DAS	-35	Sow seeds in seedbed	
7	28	Visit seedbed. If more than half of leaves are damaged, spray appropriate insecticide	
14	21		
21	14		
28 DAS	7	Plow field	
2 Days After Harvest (DAH) of 1st Crop			
7 DAH or 27 DAS	-8	Final harrowing and levelling	
36 DAS	0	Transplant	
39	3	Irrigate field	
40	4	Apply herbicide	
45	7	Monitor field for presence of insect pests, beneficial insects, and pests' damage. If economic threshold is reached, spray appropriate insecticide.	
46		Replant missing hills	
50	14	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide	
56	20	Hand weed if necessary	
57	21	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
61	25	Topdress fertilizer	
68	32	Monitor field for presence of insect pests, beneficial insects, and pests' damage. If economic threshold is reached, spray appropriate insecticide	
75	39		
82	46		
89	53		
100	64	Drain field	
105-115	70-80	Harvest	

Appendix K. Work Schedule for double crop dry season (DT-DT Pattern) under the Rice Production Enhancement Program (RPEP) November, 1987 to April, 1988.

DAS	DAT	DATE
A. Establishment of the 1st Crop (DT)		
Cut stubbles close to the ground and remove all straws from field		
-3	-38	Soak seeds
-2	-37	Incubate seeds
-1	-36	Construct seedbed
0	-35	Sow seeds in seedbed
7	-28	Visit seedbed and monitor insect damage
14	-21	Plow field
14	-21	Visit seedbed and monitor insect damage
19	-14	First harrowing of field
21	-14	Visit seedbed and monitor damage
26	-9	Second harrowing of field
28	-7	Visit seedbed and monitor insect damage
35	-1	Drain field. Apply basal fertilizer. Harrow and level field. Pull seedlings.
36	0	Transplant
39	3	Irrigate field
40	4	Apply herbicide
45	7	Monitor field for presence of insect pests, beneficial insects and pests' damage. If economic threshold is reached, spray appropriate insecticide.
46	10	Replant missing hills
50	14	Monitor field for presence of insect pests, beneficial insects and pests' damage. If economic threshold is reached, spray appropriate insecticide.
56	20	Replant missing hills
57	21	Monitor field for presence of insect pests, beneficial insects and pests' damage. If economic threshold is reached, spray appropriate insecticide
61	25	Top dress fertilizer
68	32	Monitor field for presence of insect pests, beneficial insects and pests' damage. If economic threshold is reached, spray appropriate insecticide
75	39	
82	46	
89	53	
100	64	Drain field
105-115	70-80	Harvest

DAS – Days after seeding

DAT – Days after transplanting

Appendix K (DT-DT PATTERN) Cont.

DAS	DAT	ACTIVITIES	DATE
23 Days Before Harvest (DBH) of 1st Crop	-38	B. Establishment of the 2nd Crop (DT)	
		Soak seeds	
22 DBH	-37	Incubate seeds	
21 DBH	-36	Prepare seedbed	
20 DBH or 0 DAS	-35	Sow seeds in seedbed	
7	28	Visit seedbed. If more than half of leaves are damaged, spray appropriate insecticide	
14	21		
21	14		
28 DAS	7	Plow field	
2 Days After Harvest of 1st Crop (DAH)			
7 DAH or 27 DAS	-8	Final harrowing and levelling	
36 DAH	0	Transplant	
39	3	Irrigate field	
40	4	Apply herbicide	
43	7	Monitor field for presence of insect pests, beneficial insects and pests' damage. If economic threshold is reached, spray appropriate insecticide	
46	14	Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide	

DBH — Day before harvest

DAH — Days after harvest

Appendix K (DT-DAT PATTERN) Cont.

DAS	DAT	ACTIVITIES	DATE
23 Days Before harvest (DBH) of 1st Crop	-38	B. Establishment of the 2nd Crop (DT) Soak seeds	
22 DBH	-37	Incubate seeds	
21 DBH	-36	Prepare seedbed	
20 DBH or 0 DAS	-35	Sow seeds in seedbed	
7	28	Visit seedbed. If more than half of leaves are damaged, spray appropriate insecticide	
14	21		
21	14		
28 DAS	7	Plow field	
2 Days After Harvest of 1st Crop (DAH)	7	Final harrowing and levelling	
7 DAH or 27 DAS	-8		
36 DAS	0	Transplant	
39	3	Irrigate field	
40	4	Apply herbicide	
43	7	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide insecticide	
46	14	Replant missing hills	
50		Monitor field for presence of insect pests, beneficial insects and pests damage. If economic threshold is reached, spray appropriate insecticide	
56	20		
57	21	Topdress fertilizer	
61	25	Monitor field for presence of insect pests, beneficial insects, and pests damage. If economic threshold is reached, spray appropriate insecticide	
68	32		
75	39		
82	46		
89	53		
100	64	Drain field	
105-115	70-80	Harvest	

Notes

Notes

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